

REMARKS

The Examiner's Action mailed on January 14, 2008, has been received and its contents carefully considered. Additionally attached to this Amendment are a Request for Continued Examination (RCE) and a Petition for a three-month Extension of Time extending the response period to July 14, 2008.

In this Amendment, Applicants have amended the specification and claims 5, 6 and 37, canceled claims 2 and 38, and added claim 39. Claim 5 is the independent claim, and claims 5-6, 9-10, 18, 20, 37 and 39 are pending in the application. For at least the following reasons, it is submitted that this application is in condition for allowance.

The Examiner has rejected claims 2 and 38 under 35 U.S.C. §112. Claims 2 and 38 have been canceled, rendering the rejection moot.

The Examiner has further rejected claims 5-6, 9-10, 18, 20 and 37 as being indefinite. In response, independent claim 5 has been amended to delete the limitation (i.e., "a flatness of a planarized region") that was specifically criticized by the Examiner. Accordingly, the rejections of these claims should be withdrawn. In addition, the Examiner's attention is directed to claim 37 that was rejected only for the indefiniteness, whereas the remaining claims were rejected further for obviousness. Therefore, claim 37 should be allowed.

The Examiner has rejected claims 5-6, 9-10 and 18 as being obvious over *Konuma et al. (US 2001/0019133)* (hereafter simply *Konuma*) in view of *Blalock et*

al. (US 2002/0187650) (hereafter simply *Blalock*). It is submitted that these claims are clearly patentable over the cited references for at least the following reasons.

Independent claim 5 is directed to a semiconductor apparatus that includes a silicon substrate, a planarized region defined over the silicon substrate, a metal layer disposed over the planarized region, and a semiconductor thin film. The semiconductor thin film is made of an **inorganic** compound semiconductor as a main material. The semiconductor thin film is disposed so as **not** to extend outward from edges of the metal layer. These features of the invention are not disclosed nor suggested by the cited references.

*Konuma* is directed to an EL (electro luminescence) device that includes, *inter alia*, an insulating film 39, a pixel electrode 40, protective portions 41a and 41b, and an EL layer 42. The Examiner equates the EL layer 42 with the claimed semiconductor thin film.

However, *Konuma*'s EL layer 42 is formed of an **organic** EL material (see *Konuma*, Abstract, and paragraphs [0005] and [0081]). In contrast, claim 5 has been amended to recite that the semiconductor thin film is made of an **inorganic** compound semiconductor as a main material. This amendment is supported by the original specification, page 11, lines 6-13 that recites, "Other materials, such as an aluminum-gallium indium phosphide  $((Al_xGa_{1-x})_yIn_{1-y}P$ , where  $0 \leq x \leq 1$  and  $0 \leq y \leq 1$ , a gallium nitride (GaN), an aluminum gallium nitride (AlGaN), and an

indium gallium nitride (InGaN), may also be employed." All of these materials (i.e.,  $(Al_xGa_{1-x})_yIn_{1-y}P$ , GaN, AlGaN, InGaN) are **inorganic compound** materials.

This Amendment is further supported by the specification, page 27, lines 26-29 that recites, "the semiconductor substrate may be made of other materials such as amorphous silicon, single crystal silicon, polysilicon, compound semiconductor or organic semiconductor. Here, the term "compound semiconductor" is used as a compound semiconductor different from the "organic semiconductor." Therefore, the compound semiconductor means an inorganic compound semiconductor.

In general, both an organic compound semiconductor (an organic EL) and an inorganic compound semiconductor can be used as a light-emitting element. However, the combined semiconductor apparatus of the present invention is suitable for, in particular, a light exposure device of an electrophotographic printer. The light-emitting elements in the light exposure device of the electrophotographic printer should be small size elements having a high light-emitting intensity in order to realize the printing with high resolution and at high speed (when a photosensitive drum rotates at high speed). Furthermore, since the light-emitting elements are elements having high light-emitting intensity and the heat generated in the light-emitting elements and its driver circuit are large, the light-emitting elements should be made of reliable and heat-resistant materials with small long-term deterioration in order to keep the printing quality of the electrophotographic

printer. The claimed inorganic compound semiconductor is the material that satisfies the above requirements.

A light-emitting intensity of an organic EL is becoming higher in recent years. However, since the organic EL is made of organic materials as main materials, it still has a low light-emitting intensity and the problems of low water-resistance, low heat-resistance and large long-term deterioration are not resolved. Accordingly, using an inorganic compound semiconductor as a main material of the semiconductor thin film is very important for the present invention.

Moreover, in *Konuma*, the insulating film 39 has a through hole filled up with the protective portion 41b, and the pixel electrode 40 is partly disposed on the insulating film 39. Therefore, there is unevenness on the insulating film 39 or on a combination of the insulating film 39, electrode 40 and protective portion 41b.

The EL layer 42 is adhered to this uneven layer formed by the insulating film 39, electrode 40 and protective portion 41b. This is possible because the organic EL materials are formed by coating using a spinner, and the shape of the materials formed by coating can vary freely depending on a shape of the lower layer (see *Konuma*, paragraph [0005]).

In contrast, the claimed semiconductor thin film is made of an inorganic compound semiconductor (rather than an organic compound semiconductor) as a main material, and, thus, it cannot be adhered to the uneven surface of the lower layer. In order to assure sufficient adherence of the claimed inorganic compound semiconductor to the substrate strongly, a flat layer such as the claimed

substantially planar metal layer is required. *Konuma* clearly does not disclose or even suggest a semiconductor thin film that is made of an **inorganic** compound semiconductor as a main material.

Claim 5 has been further amended to recite that the semiconductor thin film is disposed so as not to extend outward from edges of the metal layer. This amendment is supported by Figs. 13-16 and 19-22. Because the claimed semiconductor thin film cannot be attached to an uneven surface, it should not extend outward the substantially planar metal layer.

However, *Konuma*'s EL layer 42 extends outward from edges of the pixel electrode 40, and extends on the peripheral regions, e.g., a portion 41a, which has a different height (see Fig. 2). *Konuma*'s EL layer 42 extends beyond the pixel electrode 40, because the EL layer 42 is an organic layer that can be formed by coating using a spinner, allowing its shape to vary freely, so that the layer 42 can be adhered to an uneven surface. In contrast, it is very difficult to adhere the claimed inorganic compound semiconductor thin film to an uneven surface.

Accordingly, *Konuma* does not disclose or suggest the semiconductor thin film, as recited in claim 5.

The Examiner further relies on *Blalock* in rejecting the claims. However, *Blalock* does not overcome the above-noted deficiencies of *Konuma*. It is thus submitted that independent claim 5 clearly patentable over the cited references.

Because claims 6, 9-10 and 18 depend from independent claim 5, these claims are clearly patentable over the cited references for at least the same

reasons that claim 5 is patentable, as well as for the additional features that these claims recite.

The Examiner's Action has rejected claim 20 as being obvious over *Konuma* in view of *Tsuruoka et al.* (JP 2001/167874). However, *Tsuruoka et al.* do not overcome the above noted deficiencies of *Konuma*. Thus, claim 20 depending from independent claim 5 is *prima facie* patentable over the cited references for at least the same reasons that independent claim 5 is patentable. In addition, a head of an optical printer disclosed by *Tsuruoka et al.* is made of an organic EL element, whereas the claimed semiconductor thin film that is made of an **inorganic** compound semiconductor as a main material.

New claim 39 has been added. Claim 39 is supported by Fig. 13. Because claim 39 depends from independent claim 5, it is submitted that claim 39 is *prima facie* patentable over the cited references for at least the same reasons as independent claim 5, as well as for the additional features claim 5 recites.

Based on the above, it is submitted that this application is in condition for allowance and such a Notice, with allowed claims 5-6, 9-10, 18, 20, 37 and 39, earnestly is solicited.

Should the Examiner feel that a conference would help to expedite the prosecution of the application, the Examiner is hereby invited to contact the undersigned counsel to arrange for such an interview.

An RCE fee and an extension of time fee are submitted herewith. Should the remittance be accidentally missing or insufficient, or should any additional fees be requested, the Commissioner is hereby authorized to charge such fees to our deposit No. 18-0002, and is requested to advise us accordingly.

Respectfully submitted,

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Date

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## AMENDMENT

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